ARCHIVES D'ÉLECTRICITÉ MÉDICALE

EXPÉRIMENTALES ET CLINIQUES

RECUEIL BIMENSUEL FONDÉ ET PUBLIÉ

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Abonnements : France, 20 fr.; Étranger, 22 fr. Les Abonnements partent du 1^{er} janvier de chaque année et ne seront reçus que pour un An

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EXTRAIT

SUR L'EMPLOI DES RAYONS X

DANS LE

DIAGNOSTIC DE LA TUBERCULOSE PULMONAIRE

par le Dr J. F. HALLS DALLY

Archiv. d'électr. méd., nº 136, 25 février 1904.

BUREAUX DES ARCHIVES D'ÉLECTRICITÉ MÉDICALE

RUE DU TEMPLE, 6 bis

BORDEAUX



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The Roentgen rays, accidentally discovered by Prof. Roentgen of Würzburg, towards the close of the year 1895, in addition to their well-known uses in the diagnosis and treatment of surgical diseases, have now come to play a most important part in the diagnosis and prognosis of diseases of the chest.

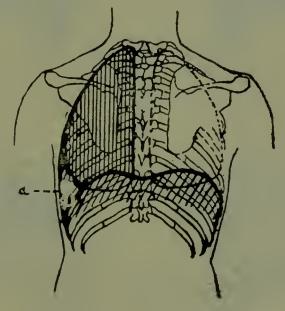
The radiograph of a normal thorax (fig. 1) presents a well-defined median opacity, limited by parallel vertical margins, on each side of which appears a «transradiant» (permeable to the X rays) area, crossed by curved and arching shadows. This opacity is caused by the spine, sternum, and mediastinum with its contents; from the upper part of this stretch two shadows, upwards and outwards, corresponding to the clavicles. With the tube posteriorly, a shadow, in outline somewhat triangular, is seen to extend more to the left than the right of the thorax. This does not obscure the outline of the curved shadows referred to above, which represent the ribs, and corresponds to the heart and pericardium. With the fluoroscope a pulsation synchronous with each heart-beat may be observed. Alongside the mediastinal opacity and following the outlines of the cardiac shadow are seen in many radiographs faint lines the nature of which is still uncertain (fig. 1 b. . It is probable that they are radiographically continuous with the junction of the parietal plenra with the pericardium. Other normal shadows are caused by the scapulae. Another somewhat dense triangular shadow occurs in muscular subjects, and is due to the large muscles of the shouldergirdle, chiefly the trapezius and pectorales major and minor. On both sides of the median opacity a clear zone corresponds to each lung, which in health is transradiant from apex to base. thus allowing the posterior portions of the ribs, as well as the anterior, to be seen and producing a «lattice-work» effect. Laterally the lungs are bounded by a darker line formed by the ribs, where the shadows of these overlap. The lungs brighten on deep inspiration, the varying degrees of transradiancy in the stages of expansion and contraction being probably due to the greater or less content of



Fig. r.

air at the time. Inferiorly, the lungs are limited by a dark shadow with its convexity upwards, not dense enough to obscure the outlines of vertebral column or ribs. This rises and falls with the respiratory movements and corresponds to the diaphragm. In some cases a narrow triangular interval is seen between the heart and diaphragm, which lengthens and widens on deep inspiration but never extends so as to divide the shadows of the heart and the liver. To this I have given the name of a cardio-phrenic space of (fig. 1 a.). Radioscopy shows no flattening of the diaphragm on inspiration, the enrice of the convexity on both sides being unaltered in descent. In quiet respiration the diaphragm moves on an average 1,3 cm. on each side; but in maximum respiration the right side moves 7.4 cm.;

and the left 6,8 cm. Loss of mobility of the diaphragm is probably the earliest indication of tuberculosis of the lung. Before any shadow due to the tuberculous process is visible, the action of the diaphragm, especially on deep respiration, becomes evidently less on the unsound side. When the disease has progressed so that the characteristic mottled shadows are visible in the lung, limitation of diaphragmatic mobility may become more pronounced, or may decrease owing to compensatory hypertrophy of the muscle elements. Marked limitation



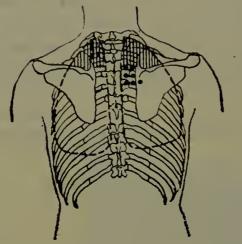
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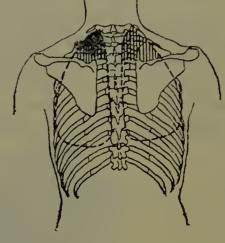
may occur even when only the apex of the lung is attacked. This is probably due, as in early cases, to toxic influences. In more advanced cases pleuritic pain is frequently present, and inhibits diaphragmatic movements.

Diagnosis, to be of much use in pulmonary tuberculosis, must be early, and one must not wait for physical signs to develop before beginning treatment.

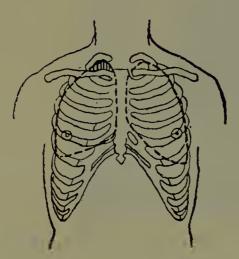
Take a typical case in which «early phthisis» is suspected with a slightly impaired note and prolonged expiration at one apex. There is a cough, but no haemoptysis, loss of flesh, nor family history of tubercle. Some would diagnose tubercle on these signs, but they may occur even with dry crepitations, resembling pleural crepitus (most frequently in the third left intercostal space), and yet be found post-mortem to be due to pulmonary embolism). The dry cracklings may be due to the forcing of air out of the vesicles in juxtaposition with the left auricle. If, however, the patient be

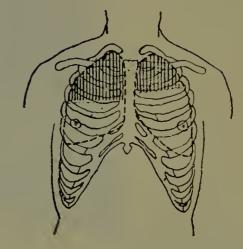
PHYSICAL EXAMINATION RADIOSCOPIC EXAMINATION



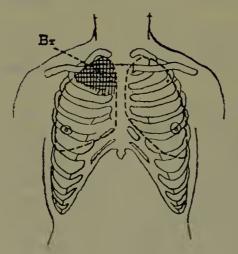


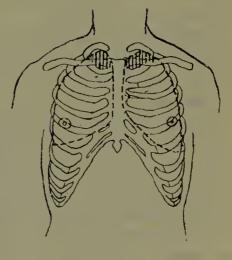
Case 1.





Case 2.





Case 3.

Fig. 3.

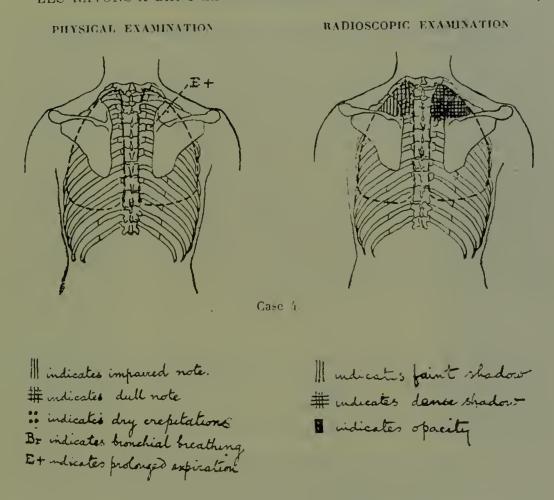


Fig. 3 (continued).

examined with the fluorescent screen a shadow of medium density will often be seen obscuring the whole of the upper lobe of the lung on the suspected side. Pulmonary tuberculosis, which has gone far enough to cause physical signs, probably is never unilateral. This point is brought out much more clearly by X-ray investigation than by the older methods. The earliest stage of invasion of the lung can be recognised only by impaired mobility of the diaphragm. In advanced disease, however damaged the base of the lung may become owing to tuberculous infiltration, a clear triangular interval is always left between it and the diaphragm, represented diagrammatically in Fig. 2. This corresponds to the lower part of the pleural cavity which is only occupied by the lung on deep inspiration. A comparison between the results of physical examination and radioscopic examination in four cases is seen in Fig. 3. In case 1, the signs to percussion, auscultation and radioscopy closely correspond. In case 2, physical signs gave no indication that the disease was other than unilateral; radioscopy shows it to be markedly bilateral and more extensive on the right side. In case 3, physical signs only pointed to unilateral involvement yet on screen examination both sides were seen in shadow. In case 4, the only physical sign discoverable was prolonged expiration in the right scapular region. Radioscopic examination showed at the right apex a dense shadow to the 4th rib, and at the left apex a light shadow to the 4th rib. The diaphragmatic movement was with quiet respiration 1,6 cm. on the right side, and 1,9 cm. on the left side, while with maximum respiration it was 7 cm. on the right side and 7,6 cm. on the left. The chief points which established the diagnosis were the shadows and limited diaphragmatic mobility. Without the aid of the X-rays this diagnosis could not have been made.

The above is a brief résumé of an original article « On the use of the Roentgen rays in the diagnosis of pulmonary disease », which appeared in *The Lancet* of June 27. 1903, and to which readers in search of fuller information on this subject are referred.

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